

# Multimedia Systems

## Lecture – 1

*By*

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# What is Multimedia?

- The term multimedia is composed of two words
  - **Multi** : numerous or multiple
  - **media** : agent for something
- **Multimedia** could be defined as the usage of multiple media or agents for communication of information.
- These media or agents could be in the form of text, images, audio, video, graphics, animation etc.

- A good general working definition is

Multimedia is the field concerned with the computer controlled integration of text, graphics, drawings, still and moving images (Video), animation, audio, and any other media where every type of information can be represented, stored, transmitted and processed digitally.

- **Example:** A music video and sound should be used together as one without another would lose its significance.

- The term **media** can be categorized based on few criteria
  - Perception media
  - Representation media
  - Presentation media
  - Storage media
  - Transmission media

## ■ Perception media

- "How do human perceive information"
- We perceive information from what we see and what we hear.
- Visual media
  - Text, graphics, images and video
- Auditory media
  - Music, sound, voice

## ■ Representation media

- "How information is encoded in the computer"
- Referring to how the information is represented internally in computer.
- Several options:
  - Text is encoded in ASCII
  - An audio data stream in PCM
  - Image in JPEG format
  - Video in MPEG format

## ■ Presentation media

- "Which medium is used to output information from the computer or input in the computer"
- Refers to physical means used by systems to reproduce information for humans, e.g: audio and visual devices.

### ● Input

- Keyboards, cameras, microphone, Head mounted device

### ● Output

- Paper, monitors, loud speakers

## ■ Storage media

- "Where information is stored"
- Refers to various physical means for storing computer data such as magnetic tapes, magnetic disks or digital optical disks (CD-ROM, CD, DVD)

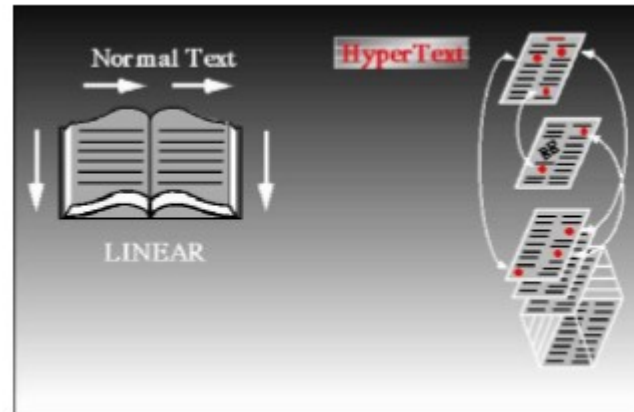


## ■ Transmission media

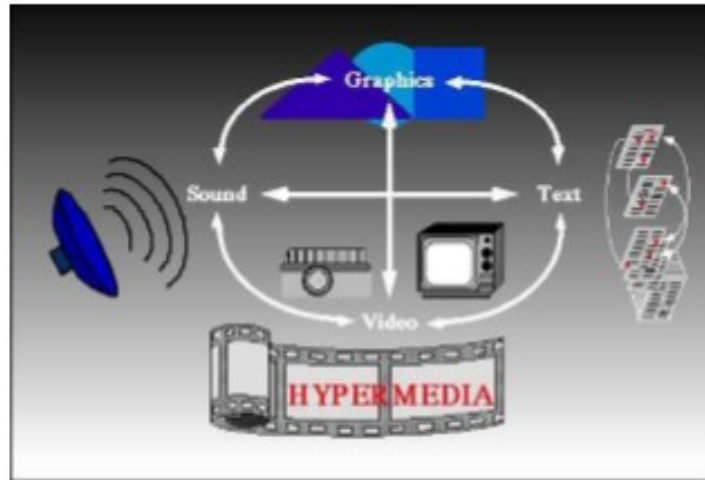
- "Which medium is used to transmit data"
- Refers to physical means - cable of various type (coaxial cable, twisted pair, fibre optics), radio tower, satellite - that allow the transmission of telecommunication signals.

# Characteristics of multimedia

- It can increase the impact of the message or impact on the user.
- **Interactivity:**
  - When the end-user is able to control the elements of media that are required, and subsequently obtains the required information in a non-linear way.
- **Hypertext and Hypermedia support:**
  - **Hypertext** is a text which contains links to other texts.
  - Traversal through pages of hypertext is therefore usually non-linear (as indicated below)



- **HyperMedia** is not constrained to be text-based. It can include other media, e.g., graphics, images, and especially continuous media - sound and video.
- The World Wide Web is the largest and most commonly used hypermedia application.



- It can involve more than one input device.
- It can repeated (over and over).
- It is generally dynamic, not static.

# Categories of Multimedia

- Multimedia may be divided into following three categories based on their functions and how they are organized.
- **Linear and non-linear:** Linear active content progresses without any navigation control for the viewer such as a cinema presentation. Non-linear content offers user interactivity to control progress as used with a computer game or used in self-paced computer-based training.
- **Interactive and non-interactive:** Interactive multimedia is the means to interface with different media through input (e.g., a computer keyboard, mouse, touch screen, on screen buttons, and text entry, etc.) and output devices allowing a user to make decisions as to what takes place next with multimedia
- **Real-time and recorded:** Multimedia presentations can be live (real-time) or recorded. A recorded presentation may allow interactivity via a navigation system. A live multimedia presentation may allow interactivity via interaction with the presenter or performer.

# Multimedia Applications

- **Definition:** A Multimedia Application is an application which uses a collection of multiple media sources e.g. text, graphics, images, sound/audio, animation and/or video.
- **Examples:**
  - **Video Teleconferencing:** Transmission of synchronized video and audio in real-time through computer networks in between two or more multipoints (or participants) separated by locations.
  - **Multimedia Store and Forward Mail:** Allow users to generate, modify and receive documents that contain multimedia. Eg. Gmail, Hotmail, Yahoo etc.
  - **Advertising and Purchasing:** Most of the web sites visited have many advertisements with multimedia features with the objective of marketing merchandise or offering services online.

- For entertainment:

- Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animations. Multimedia games are a popular pastime and are software programs available either as CD-ROMs or online

- For Education:

- Multimedia is used to produce computer-based training courses (popularly called CBTs) and reference books like encyclopedia and almanacs.

- For Healthcare:

- Multimedia best use in healthcare is for real time monitoring of conditions of patients in critical illness or accident.
- Multimedia makes it possible to consult a surgeon or an expert who can watch an ongoing surgery live on his PC monitor and give online advice at any crucial juncture.

- Other multimedia applications available to us at home are

- Basic Television Services, Digital Audio, Video on demand, Home shopping, Digital multimedia libraries, E-Newspapers, e-magazines

# History of Multimedia

- Multimedia to communicate ideas might begin with newspapers, which were perhaps the first mass communication medium, using text, graphics, and images.
- Thomas Alva Edison 'commissioned the invention of a motion picture camera in 1887.
- In 1895, Guglielmo Marconi sent his first wireless radio transmission at Pontecchio, Italy. Initially invented for telegraph, radio is now a major medium for audio broadcasting.
- Television was the new medium for the twentieth century. It established video as a commonly available medium and has since changed the world of mass communication.

The connection between computers and digital media represented using the discrete binary format, emerged only over a short period:

**1945** : As part of MIT's postwar deliberations on what to do with all those scientists employed on the war effort, Vannevar Bush (1890-1974) wrote a landmark article describing what amounts to a hypermedia system, called "Memex."

**1960s** Ted Nelson started the Xanadu project and coined the term "hypertext."

**1967** Nicholas Negroponte formed the Architecture Machine Group at MIT.

**1969** Nelson and van Dam at Brown University created an early hypertext editor called FRESS.

**1976** The MIT Architecture Machine Group proposed a project entitled "Multiple Media." This resulted in the Aspen Movie Map, the first videodisk, in 1978.

**1982** The Compact Disc (CD) was made commercially available by Philips and Sony, which was soon becoming the standard and popular medium for digital audio data.

**1985** Negroponte and Wiesner co-founded the MIT Media Lab, a leading research institution investigating digital video and multimedia.



1990 Kristina Hooper Woolsey headed the Apple Multimedia Lab, with a staff of 100.

1991 MPEG1 was approved as an international standard for digital video. Its further development led to newer standards, MPEG-2, MPEG- 4, and further MPEGs, in the 1990s.

1991 The introduction of PDAs in 1991 began a new period in the use of computers in general and multimedia in particular.

1992 JPEG was accepted as the international standard for digital image compression, which remains widely used today.

1992 The first audio multicast on the multicast backbone (MBone) was made.

1995 The JAVA language was created for platform-independent application development, which was widely used for developing multimedia applications.

1996 DVD video was introduced; high-quality, full-length movies were distributed on a single disk.

1998 Handheld MP3 audio players were introduced to the consumer market, initially with 32 MB of flash memory.

2000 World Wide Web (WWW) size was estimated at over 1 billion pages.

- 2001 The first peer-to-peer file sharing (mostly MP3 music) system.
- 2003 Skype was released for free peer-to-peer voice over the Internet.
- 2004 Web 2.0 was recognized as a new way to utilize software developers and end-users use the Web.
- 2005 YouTube was created, providing an easy portal for video sharing, which was purchased by Google in late 2006.
- 2006 Twitter was created, and rapidly gained world wide popularity, with 500 million registered users in 2012.
- 2007 Apple launched the first generation of iPhone, running the iOS mobile operating system.
- 2008 The first Android-powered phone was sold and Google Play the Android's primary app store, was soon launched.
- 2009 The first LTE (Long Term Evolution) network was setup making an important step toward 4G wireless networking.
- 2010 Netflix, which used to be a DVD rental service provider, migrated its infrastructure to the Amazon AWS cloud computing platform, and became a major online streaming video provider.